

Appl. No. 10/061,550
Amdt. Dated March 8, 2005
Reply to Office action of November 10, 2004

REMARKS

Reconsideration of the above-identified application in view of the present amendment is respectfully requested. By the present amendment, claim 23 is rewritten to include the limitations of claim 27. In view of the redundancy that would otherwise be present, claim 27 is cancelled and the dependencies of claims 28, 31, and 32 are adjusted.

The rejection of claims in view of an asserted combination of teaching from Lai (U.S. Patent No. 6,259,185) in view of either Brice (U.S. Patent No. 4,472,652) or Nakano patent (U.S. Patent No. 6,580,189) is respectfully traversed.

In order to analyze the asserted combination, it is reasonable and prudent to understand the teachings presented by each of the references. Turning to the Lai patent, it is easily appreciated that a two or three layer electrode is disclosed (see Fig. 2 and 3), and the electrode includes Ti and TiAl alloy. Lai acknowledges the problem of electromigration due to mechanical stress (see col. 4, lines 30-31). However, it should be clearly understood what the Lai patent presents as a solution to electromigration. As disclosed in the Lai patent, the layer 22 is made of Al and Ti alloy. As set forth at col. 4, lines 20-22, of the Lai patent, "[t]he alloying of the second layer 22 is used for better strength due to impurity hardening by fine TiAl₃ precipitates and better metallurgical stability than pure aluminum." In other words, Lai patent discloses that the layer (22) that has a propensity to migrate is actually itself made in such a way that REDUCES its propensity to migrate. Thus, the layer 22 containing Al and Ti can be considered a non-migrating layer. The Lai patent does not teach to use another (barrier) layer for providing a hardening effect. As

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such, the Lai patent teaches a completely different approach to the problem than the present invention.

Turning to the teaching provided by the Brice and Nakano patents, it is to be appreciated that an aluminum layer of the disclosed device has oxidation.

Now focusing upon what a person of ordinary skill in the art would discern from the teachings of Lai, Brice, and Nakano patents, it would seem logical that the person of ordinary skill in the art would see the approach of the Lai patent as being completely different from the approach of the Brice and Nakano patents. One way to appreciate this distinction is to query why would the person of ordinary skill in the art even seek to modify the structure disclosed by the Lai patent to include a migration-inhibiting oxidation layer when there is no need because of the use of anti-migration material (Ti-Al) is already addressing the issue of migration. It is just not logical to assert that a person of ordinary skill in the art would naturally look to modify a structure to solve a problem that is already solved, especially for the mere purpose of solving the problem (as presented in the Office action).

Focusing now on the claim language, it will clear that even if one were to even try to modify the device of the Lai patent using teachings from Brice and Nakano patents the present invention would not be provided. First it should be recalled that the claims include three layers. This was clarified some time ago (e.g., during telephone discussion with the Examiner), and thus is easily appreciated. With the presence of three layers, it would seem logical that the person of ordinary skill in the art would be looking at the embodiment of Fig. 3 of the Lai patent because that embodiment has three layers. If the person of ordinary skill in the art would try to

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modify the Lau Fig. 3 embodiment in view of teachings from Brice or Nakano, then two logical results could occur.

The first logical possibility is that an Al-Oxide layer is added on top of the existing stack (i.e., on top of the titanium layer 24), then the Al-Oxide layer would be on top of another barrier layer (i.e., the titanium layer 24). However, it is to be appreciated that the claim language is presented in terms of migrating metal / barrier / immigration layer. With the Al-Oxide layer on top of the existing stack, the pattern would be non-migrating metal alloy / barrier / barrier, and thus the claim limitations would not be met. As the other logical possibility, an Al-Oxide layer is inserted between the layer 22 (Ti-Al alloy) and the layer 24 (Titanium) of the Lau Fig. 3 embodiment. However, such a modification would result in the same pattern (non-migrating metal alloy / barrier / barrier) and the claim limitations would again not be met.

Even if the person of ordinary skill in the art were to look at the embodiment of Fig. 2 of the Lau patent, the addition of the Al-Oxide layer would merely result in a pattern of non-migrating metal alloy / barrier, and not migrating metal / barrier / immigration layer. However, such a possibility does not seem logical because as mentioned above, the Lua patent already addresses the problem with the non-migrating metal layer.

Therefore, the person of ordinary skill in the art would not have been led to make the asserted combination, and even if the person some use the teachings, the present invention would not be provided.

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With regard to the rejection based upon the the patent to Taniguchi (US Patent No. 6,404,101), it should be appreciated that the combination of the subject matter of claim 27 into claim 23 has removed the Taniguchi rejection from further consideration.

Again, it is requested that the method claims be rejoined as the method claims are similarly patentable over the cited references.

If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 16-0820, our Order No. 33923.

Respectfully submitted,

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